

# NASA TECH BRIEF

*Lyndon B. Johnson Space Center*



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## Microbial Load Monitor

### The problem:

Manual methods are still used for the identification of pathogenic micro-organisms in human samples, food, water, air, sewage, etc. These methods require 24 to 72 hours or more to finalize their identifications.

### The solution:

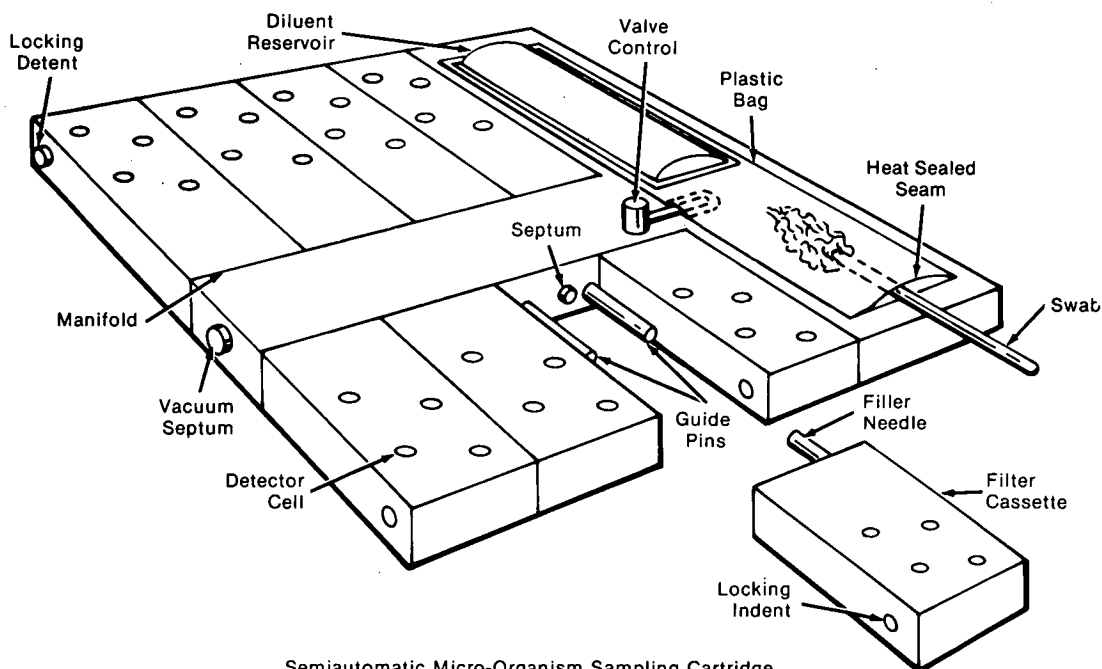
A microbial load monitor (MLM) can detect and identify a number of medically important micro-organisms in an average of approximately 8 hours.

### How it's done:

The MLM utilizes a cartridge containing special selective media, and a solid-state electro-optical detector imbedded in incubator blocks. The cartridge (see figure) comprises a set of filter cassettes mounted on a single manifold. One end of the manifold has a plastic bag divided into two compartments. One

compartment contains a diluent reservoir filled with distilled water and sealed. The other compartment has an open end for the insertion of a swab containing the micro-organism sample to be tested. The entire bag connects with the rest of the manifold through a valved opening. A vacuum septum is provided at the other end of the manifold for connection to the vacuum pump.

The cassettes used with the cartridge are equipped with four bacteria filters. Each filter is placed before a detector cell containing a dried culture medium favorable to a specific micro-organisms strain. Thus, each cassette is programmed to detect only one type of micro-organism with the four detector cells. The detector cells are transparent on both top and bottom, to transmit light during the detection process. Each cassette has a set of guide pins and a filler needle for attachment to the manifold.



Semiautomatic Micro-Organism Sampling Cartridge

(continued overleaf)

In operation, the swab containing the specimen to be analyzed is inserted into the open end of the plastic bag. The swab handle is broken off, and the bag is heat sealed, retaining the swab tip inside.

Cassettes are then selected which contain culture media for a given sample type. Once selected, the cassettes are inserted into the manifold by pressing them against the guide pins. The pressure forces filler needle through the manifold septum, placing the cassette in direct communication with the internal channels of the manifold.

With all of the cassettes attached, the manifold is evacuated by a vacuum pump through the vacuum septum. After evacuation, the valve connecting the plastic bag with cassettes is closed. The reservoir bag is then broken manually to let the water mix with the sample. After the mixture is agitated thoroughly, the valve is opened to let the diluted specimen flow into the cassettes.

As the mixture enters each cassette, it is progressively filtered before each detection cell. Most probable numbers of micro-organisms in the original sample can be determined in many cases by the extent of growth throughout the cassette series.

After all of the cassettes are filled, they are heated to allow the micro-organisms an incubation period. During incubation, the cassettes are monitored with an electro-optical detector, equipped with four photodiodes for each detector cell. Light transmitted through each cell is detected by the photodiodes, which emit current proportional to the light received. These data are transmitted through an analog-to-digital converter to the data display unit. The data are plotted in cartesian coordinates as a percentage of light transmitted through each cell, as a function of time.

Each cassette provides four curves for each detector cell. When particular bacteria are present, the detector cells will transmit only part of the light input.

The amount of light absorbed for each cell will then indicate the presence or absence of the specific micro-organism for which the cassette has been programed.

**Notes:**

1. Although designed for examination of human urine, throat, fecal, and skin samples, the MLM can be used with a variety of other samples.
2. The device is described in the following report:  
Reference: NASA CR-114922 (N74-71631)  
Microbial Load Monitor

Copy of this report may be obtained at cost from:

Technology Application Center  
University of New Mexico  
Albuquerque, New Mexico 87131  
Telephone: 505-277-3622  
Reference: B75-10167

3. Specific technical questions may be directed to:  
Technology Utilization Officer  
Johnson Space Center  
Code AT3  
Houston, Texas 77058  
Reference: B75-10167

**Patent status:**

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act [42 U.S.C. 2457(f)], to the McDonnell Douglas Astronautics Company-East, St. Louis, Missouri 63166.

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